

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
28 April 2005 (28.04.2005)

PCT

(10) International Publication Number
WO 2005/037144 A2

(51) International Patent Classification⁷: A61F 2/14

(21) International Application Number:
PCT/US2004/032934

(22) International Filing Date: 7 October 2004 (07.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/510,359 10 October 2003 (10.10.2003) US
60/510,349 10 October 2003 (10.10.2003) US
60/510,350 10 October 2003 (10.10.2003) US

(71) Applicant (for all designated States except US): CELLU-
LAR BIOENGINEERING, INC. 7 [US/US]; 1946 Young
Street, Suite 480, Honolulu, HI 96826 (US).

(71) Applicant and

(72) Inventor: LIU, Ge, Ming [US/US]; 55 South Kukui Street,
Apt. 2810, Honolulu, HI 96813 (US).

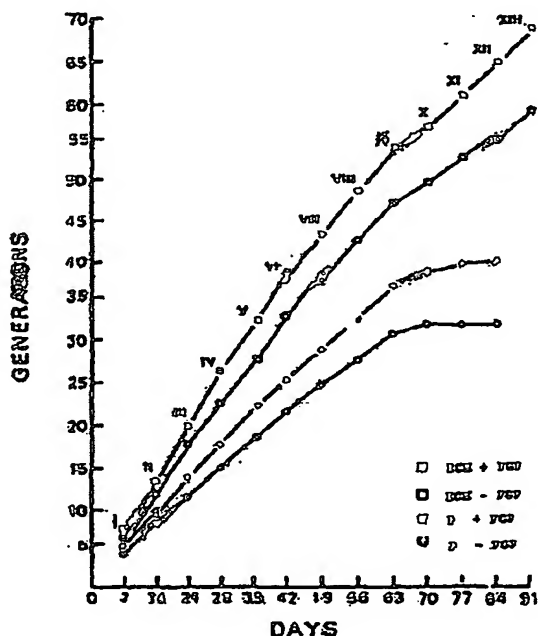
(74) Agent: CONTRERA, Joseph, G.; Jacobson Holman
PLLC, 400 Seventh Street, N.W., Suite 600, Washington,
DC 20004 (US).

(51) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MY, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(54) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, NA, NL, NO, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

[Continued on next page]

(54) Title: METHODS AND COMPOSITIONS FOR GROWING CORNEAL ENDOTHELIAL AND RELATED CELLS ON
BIOPOLYMERS AND CREATION OF ARTIFICIAL CORNEAL TRANSPLANTS



(57) Abstract: This invention discloses methods to attach and grow a monolayer of cultured human corneal endothelial cells onto the endothelial side of the stroma synthesized from biopolymer to generate a more bio-equivalent artificial cornea. The approaches will include the use of attachment and growthpromoting agents such as fibronectin, laminin, RGDS, collagen type IV, bFGF conjugated with polycarbophil, and EGF conjugated with polycarbophil. The patent also describes a method to create a self-sustaining polymer containing adhesive molecules and growth factors to support the attachment and proliferation of cultured human corneal endothelial cells for corneal transplantation either as a half thickness device or full-thickness button replacement. An approach for the implantation of cultured retinal pigment epithelial (RPE) cells into the sub-retinal space for treatment of age-related macular degeneration (ARMD) is disclosed in this invention. This method will enable the delivery of the transplanted RPE in a sheet of monolayer cells and will be better suited to perform their physiological function.